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Please find below and/or attached an Office communication concerning this application or proceeding.

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte ANTHONY J. KONECNI
and GIRISH A. DIXIT

Appeal 2009-0565
Application 08/988,686
Technology Center 2800

Decided:[1] February 24, 2009

Before CHARLES F. WARREN, CATHERINE Q. TIMM, and BEVERLY A. FRANKLIN, *Administrative Patent Judges*.

Opinion for the Board filed by *Administrative Patent Judge* FRANKLIN.

Opinion Concurring filed by *Administrative Patent Judge* WARREN.

FRANKLIN, *Administrative Patent Judge*.

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[1] The two-month time period for filing an appeal or commencing a civil action, as recited in 37 C.F.R. § 1.304, begins to run from the Decided Date shown on this page of the decision. The time period does not run from the Mail Date (paper delivery) or Notification Date (electronic delivery).

DECISION ON APPEAL
STATEMENT OF THE CASE

Appellants seek our review under 35 U.S.C. § 134 of the final rejection of claims 21-32. We have jurisdiction under 35 U.S.C. § 6(b) (2002).

Claims 21, 26, and 29 are representative of the subject matter on appeal and are set forth below:

21. A method of fabricating an electronic device having a first electrically conductive structure electrically connected to a second electrically conductive structure situated over a semiconductor substrate, said method comprising the steps of:

forming said first electrically conductive structure;

forming an insulating layer extending above said first electrically conductive structure, said insulating structure having an opening with sidewalls and a bottom and exposing a portion of said first conductive structure;

providing a halogen-free gas comprised of hydrogen incorporated within a plasma into said opening in said insulating layer and onto the exposed portion of said first conductive layer to increase the reactive surface of any residual material on said exposed portion and at least partially remove said residual material; and

then depositing a conductive material into said opening and onto said exposed portion using chemical vapor deposition.

26. The method of claim 21 wherein said plasma has a plasma power of from about 150 watts to about 450 watts.

29. The method of claim 21 wherein said step of providing a gas into said opening is at a temperature of from about 100 °C to about 450 °C.

The prior art relied upon by the Examiner in rejecting the claims on appeal is:

Pan	US 6,008,139	Dec. 28, 1999
Masamori	JP 0-171744[2]	Jun. 18, 1992

Takeyasu, "Characterization of Direct-Contact Via Plug Formed by Using Selective Aluminum Chemical Vapor Deposition," Jpn. J. App. Phys. 33, Part 1, No. 1B, 424-425 (1994).

SUMMARY OF THE DECISION

We affirm.

THE REJECTIONS

The Examiner rejected claims 21-26, 29, and 30 under 35 U.S.C. § 103(a) as being obvious over Masamori in view of Takeyasu et al. (Takeyasu).

The Examiner also rejected claims 27, 28, 31, and 32 under 35 U.S.C. § 103(a) as being obvious over Masamori in view of Takeyasu and further in view of Pan et al. (Pan).

ISSUE

Have Appellants shown that the Examiner reversibly erred in rejecting claims 21-26, 29, and 30 under 35 U.S.C. § 103 as being obvious over Masanori in view of Takeyasu? Also, have Appellants shown that the Examiner reversibly erred in rejecting claims 27, 28, 31, and 32 under

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[2] In the Supplemental Examiner's Answer mailed May 12, 2008, the Examiner made of record a full English translation of Masanori in response to the Remand by the Board mailed September 27, 2005.

35 U.S.C. § 103 as being obvious over Masanori in view of Takeyasu and further in view of Pan?

FINDINGS OF FACT

Appellants invented a method that uses the chemically reactive properties of hydrogen ions in cooperation with physical bombardment of the surface to wholly or partially remove residual material from the surface prior to selective sequential in situ chemical vapor deposition of a suitable conductive material (Spec. 2, ll. 16-21).

Figure 2 shows an integrated cluster tool 90 that directs plasma 42 toward surfaces of the semiconductor device 8 within chamber 64 (Spec. 8, ll. 11-15). Plasma 42 includes inert ions as indicated by solid arrows 44, and hydrogen ions as indicated by dashed arrows 46. Inert ions 44 may include argon, helium, or any other inert ions, in any appropriate combination (Spec. 8, ll. 15-19).

Masanori discloses a method of removing a degenerated layer wherein a step involving dry etching cleaning is applied to a lower aluminum wiring layer exposed via holes in an insulating layer using a mixed gas comprising a rare gas and a hydrogen gas (Masanori 3, last para., 4, fourth para. of the English translation). Masanori teaches operating temperatures above 100 °C (Masanori 4, fourth para. of the English translation).

Takeyasu teaches the known method of depositing an aluminum plug in a contact hole by selective CVD after performing a cleaning step (Abstract; Fig. 1B).

Pan discloses the use of a bias power level of from about 20 to about 1000 watts applied to a cathode electrode while performing a plasma function (col. 6, ll. 16-30).

PRINCIPLES OF LAW

The prima facie case is a procedural tool of patent examination, allocating the burdens of going forward as between examiner and applicant. *In re Spada*, 911 F.2d 705, 707 n.3 (Fed. Cir. 1990). The term " prima facie case" refers only to the initial examination step. *In re Piasecki*, 745 F.2d 1468, 1472 (Fed. Cir. 1984); *In re Rinehart*, 531 F.2d 1048, 1052 (CCPA 1976). As discussed in *In re Piasecki*, the examiner bears the initial burden, on review of the prior art or on any other ground, of presenting a prima facie case of unpatentability. If that burden is met, the burden of coming forward with evidence or argument shifts to the applicant. After evidence or argument is submitted by the applicant in response, patentability is determined on the totality of the record, by a preponderance of evidence with due consideration to persuasiveness of argument. *See In re Spada, supra; In re Corkill*, 771 F.2d 1496, 1500 (Fed. Cir. 1985); *In re Caveny,* 761 F.2d 671, 674 (Fed. Cir. 1985); *In re Johnson*, 747 F.2d 1456, 1460 (Fed. Cir. 1984). Obviousness can be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the reference or in the knowledge generally available to one of ordinary skill in the art. *In re Fine*, 837 F.2d 1071, 1074 (Fed. Cir. 1988).

ANALYSIS

With regard to the rejection of claims 21-26, 29, and 30 under 35 U.S.C. § 103 as being obvious over Masanori in view of Takeyasu, the point of dispute involves whether Masanori teaches "providing a halogen-free gas comprised of hydrogen incorporated within a plasma" as recited in Appellants' claim 21.

The Examiner correctly explains that Masanori uses a plasma consisting of argon and hydrogen to clean a surface of the aluminum wiring exposed to a contact hole (Supple. Ans. 9). The Examiner correctly points out that the plasma is halogen free, and refers to the full English translation of Masanori in the sections entitled "Means to solve the problem," "Function," and "Application example," (Supple. Ans. 9). [3]

Appellants argue that the plasma of Masanori is not halogen-free because Masanori teaches that fluorine and oxygen in the denatured layer react with the plasma to form hydrofluoric acid and water. Appellants refer to the fourth paragraph on page 4 of the full English translation of Masanori in this regard, as well as the Abstract (Second Reply Br. 3).

As pointed out by the Examiner at the top of page 10 of the Supplemental Examiner's Answer, no gases containing a halogen are used in the plasma. The English translation of Masanori teaches that a "mixed gas comprising argon gas as a rare gas and a hydrogen gas is used (Masanori 4, fourth para. of the English translation). [4] This dry etching step of Masanori satisfies Appellants' claim language of "providing a halogen-free gas

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[3] In the Second Reply Brief filed on June 2, 2008, Appellants assert that the full English translation of Masanori is not of record by stating that because prosecution was not re-opened by the Examiner, the Examiner limited the rejection to the content of the Abstract of Masanori. This is incorrect. The Remand mailed on September 27, 2005 required the Examiner to make the full English translation of record so that Appellants would have the opportunity to respond (Remand 4). The Examiner made the full English translation of record in the Supplemental Examiner's Answer mailed on May 12, 2008. Appellants provide comments on the full English translation on pages 3-4 of the Second Reply Brief.

[4] This is the same teaching found in the Abstract wherein the Abstract teaches to use an "argon-hydrogen mixture".

comprised of hydrogen incorporated within a plasma." Any chemical reactions that occur after this step do not alter the fact that Masanori begins with a plasma of a halogen-free gas comprised of hydrogen, which is what is required by Appellants' claim 21.

With regard to the secondary reference of Takeyasu, we agree with the Examiner that the combination is a proper one based on the Examiner's analysis as set forth on page 6 of the Supplemental Examiner's Answer. Appellants have not demonstrated that the Examiner committed a reversible error in this analysis.

With regard to the rejection of claims 27, 28, 31, and 32 under 35 U.S.C. § 103(a) as being obvious over Masanori in view of Takeyasu and further in view of Pan, these claims involve specific operating parameters of plasma power and temperature.

As discussed by the Examiner on page 8 of the Supplemental Examiner's Answer, Pan teaches Appellants' claimed plasma power range. The full English translation of Masanori teaches Appellants' operating temperature range. For example, in the fourth full paragraph of the full English translation, Masanori teaches that the process is usually carried out at a temperature higher than the boiling point of hydrogen (higher than 100 °C). The Examiner also correctly states that operating parameters such as plasma power is an obvious design choice (Supple. Ans. 8). The limitation of a process with respect to ranges such as pH, time and temperature does not impart patentability to a process when such values are those which would be determined by one skilled in the art in achieving optimum operation of the process. *In re Mostovych,* 339 F2d 455, 458 (CCPA 1964); *In re Aller,* 220 F2d 454, 459 (CCPA 1955).

CONCLUSIONS OF LAW

Appellants have failed to establish that the Examiner reversibly erred in rejecting claims 21-26, 29, and 30 under 35 U.S.C. § 103(a) as being obvious Masamori in view Takeyasu.

Appellants have also failed to establish that the Examiner reversibly erred in rejecting claims 27, 28, 31, and 32 under 35 U.S.C. § 103(a) as being obvious over Masamori in view of Takeyasu and further in view of Pan.

DECISION

The decision of the Examiner is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv)(effective Sept. 13, 2004).

AFFIRMED

WARREN, *Administrative Patent Judge*, Concurring:

I concur in the decision of the majority of this panel to affirm the decision of the Examiner. I write separately to address the procedural issues raised by Appellants.

The record shows Appellants submitted the Masanori Japanese Kokai Patent Application (Masanori) and a Japanese Patent Office Abstract (Abstract) of that document, as supplied by the European Patent Office, in the Information Disclosure Statement filed July 20, 1998. The Examiner relied on the Abstract at page 6 of the Office Action mailed February 19, 2002. Appellants responded with respect to the Abstract at page 5 of the Substitute Appeal Brief filed April 19, 2002. The Examiner mailed an Answer on July 17, 2002, again referring to the Abstract at pages 4 and 7, and Appellants filed a Reply Brief on September 4, 2002, responding thereto.

The Examiner's Communication mailed November 19, 2002, with respect to this Reply Brief, includes the following statement: "An English-language translation of [Masanori] is attached." In the Communication filed December 13, 2002, Appellants replied "that the translation is not of record in this appeal since it was never cited during prosecution."

In the Remand entered August 20, 2003, in Appeal No. 2003-1768 in this Application, the merits panel noted the Communication mailed November 19, 2002, did not include a copy of the "translation" and notice of the same was not provided to Appellants until after the Reply Brief was filed. The Application was remanded to the Examiner to address these matters, stating "[i]f reliance upon the English translation in any way

constitutes a new ground of rejection, we authorize the examiner to reopen prosecution of the application. Otherwise, we authorize the examiner to file a Supplemental Examiner's Answer."[5] Remand 2.

On December 11, 2003, in response to a request from the Examiner, Appellants filed a copy of the Communication mailed November 19, 2002, including the Translation of Masanori [Translation].[6] This is the only copy of the Translation in the Official USPTO electronic files of this Application. In the Supplemental Answer mailed March 18, 2004, the Examiner noted that "a copy of the full translation was mailed to Appellants on November 19, 2002." In the Reply Brief filed May 13, 2004, Appellants acknowledged receipt of the Translation, stating "in order for the translation to be of record, it is necessary that [sic] Examiner withdraw the final rejection and make the translation of record in the proper manner." In the Communication mailed July 7, 2004, with respect to this Reply Brief, the Examiner stated "[t]he entire English-language translation need not be relied upon, since the claims are not patentable over the abstract, which has consistently been relied upon in rejecting the appealed claims."

In the Remand entered September 27, 2005, in Appeal No. 2005-1240 in this Application, the merits panel stated that both the Examiner and Appellants should consider the Translation. Remand 3. The Application was remanded to the Examiner for this purpose, stating "[i]f reliance upon the English translation in any way constitutes a new ground of rejection, we authorize the examiner to reopen prosecution of the application. Otherwise,

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[5] 37 C.F.R. § 1.193(a)(2), in effect at that time, states in pertinent part, "An examiner's answer must not include a new ground of rejection."

[6] Translation of Masanori prepared for the USPTO by The Ralph McElroy Translation Company (PTO 02-3523, July 2002).

we authorize the examiner to file a Supplemental Examiner's Answer wherein the full English translation is relied upon."[7] Remand 4.

The Examiner specifically relied on the Translation as well as the Abstract in the Supplemental Examiner's Answer mailed May 19, 2006. In the Reply Brief filed June 6, 2006, Appellants contended that the Examiner had not reopened prosecution, and thus, "the examiner has limited the rejection to the content of the Abstract of the Japanese patent and not to the translation thereof." In the Communication mailed August 18, 2006, with respect to this Reply Brief, the Examiner stated: "The translation of [Masanori] is made officially of record on the form PTO-892 attached hereto."

In the Order Returning Undocketed Appeal To Examiner mailed September 18, 2006, the Board Ordered return of the Application to the Examiner to obtain, among other things, the signature of a Technology Center Director or designee on the Supplemental Examiner's Answer mailed May 19, 2006.

The Supplemental Examiner's Answer mailed May 12, 2008, significantly differs from the Supplemental Examiner's Answer mailed May

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[7] 37 C.F.R. §§ 41.39(b) and 41.50(a)(2) were in effect at that time and at present. § 41.39(b) specifies the two options governing Appellants' response if an examiner's answer includes a new ground of rejection. § 41. 50(a)(2) specifies the two options governing Appellants' response if a supplemental examiner's answer is written in response to a Board remand for further consideration of a aground of rejection. The two options in each rule are the same: (i) request prosecution be reopened before the Primary Examiner by filing a reply under 37 C.F.R. § 1.111; or (ii) request that the appeal be maintained by filing a reply brief as set forth in § 41.41. *See also* Manual of Patent Examining Procedure (MPEP) §§ 1207.02 and 1121.01 (Rev. 3, August 2005).

19, 2006, in that it contains on page 2 the statement that the Remand entered September 27, 2005, was "for further consideration of a rejection" and the Answer supplied under 37 C.F.R. § 41.50(a)(2), because the Remand required "a Supplemental Examiner's Answer wherein the full English-language translation of [Masanori] is relied on." Supp. Ans. 2. The Examiner included notice to Appellants of the two response options specified in this rule. Supp. Ans. 2-3; *see above* note 6. The standardized paragraph format followed by the Examiner in these respects is specified in MPEP § 1211.01. The signature of a Technology Center Director appears after the notice to Appellants. Supp. Ans. 3.

By filing the Second Reply Brief on June 2, 2008, Appellants availed themselves of the option of maintaining the appeal under § 41.50(a)(2)(ii). The Examiner entered and considered the Second Reply Brief as evinced in the Communication mailed August 13, 2008.

Procedurally, Appellants has fared no better or worse than if the Supplemental Answer included a new ground of rejection. *See above* note 6. Indeed, the Second Reply Brief sets forth Appellants' position with respect to the disclosure in the Abstract at page 3 and the Translation at pages 2-4. Appellants did not change their arguments with respect to the Abstract and the Translation from the positions taken at pages 2-3 of the Reply Brief filed June 6, 2006. Arguments which Appellants could have made in the Second Reply Brief but did not are deemed waived. *See* 37 C.F.R. § 41.37(c)(1)(vii).

Accordingly, on this record and contrary to Appellants' contentions at pages 2-3 of the Second Reply Brief, I am of the opinion that the Supplemental Answer mailed May 12, 2008, and the Second Reply Brief filed June 2, 2008, contain the complete exposition of the respective positions of the Examiner and of Appellants with respect to the disclosure of Masanori as reflected in the Abstract and the Translation.

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